

produce injurious consequences, especially when continued for a length of time, but this has not been his experience; on the contrary, he has given it in half ounce doses frequently repeated, and always with the happiest effect. In fact, experience daily proves to us that in order to obtain the proper effects of nearly all medicines, they must be administered in much larger doses than is at present done.

During the whole course of the disease I continue the use of the chlorate of potassa, but decrease the dose on the return of the secondary fever. I find that it answers all indications, and besides its refrigerant effects it acts also as a tonic, giving new vigour to the enfeebled system.

The painful excoriation and plugging up of the nostrils of young infants may be remedied to some extent by an early and daily use of a solution of tannin in glycerin, applied to the inner surface of the nostrils.

To relieve constipation, the bisulphate of potassa is preferable to any other cathartic on account of its tonic effects, and mild yet efficient action. In the obstinate diarrhoeas which sometimes set in, the writer has found the liquor ferri pernitratis succeed after other astringent remedies had failed.

The solution of chlorinated soda recommended by Dr. G. B. Wood, is the best application that can be made to the pseudo-membranous matter in the fauces.

Baths containing vinegar are of use in preventing contagion, and become very grateful to the patient.

During the course of the disease, the diet should be light and nutritious; and after the fourteenth day small doses of quinia and proto-carbonate of iron, or nux vomica and tincture of the chloride of iron may be given. Excessive restlessness or pain may be relieved by syrup of lactucarium or an opiate.

Among other essentials may be mentioned a large well-aired room, rest, and a lightly-covered bed.

ART. VI.—*On Fracture of the Astragalus.* By JOHN ASHHURST, Jr., M. D., Resident Surgeon to Pennsylvania Hospital.

ON Sunday, the 17th of November, 1861, a man was admitted into the Pennsylvania Hospital, suffering from an injury equally serious and unusual. He had been drinking to great excess for about a month before his accident, and in a dream, during his drunken sleep, jumped from the window of his room, in the fourth story of a lodging-house, alighting squarely on his feet, and subsequently on his right hip.

When I first saw him, a few hours after his fall, the right foot was much swollen, with a great subcutaneous effusion above and in front of the external malleolus. Below, and slightly posterior to the malleolus

was a hard, bony protuberance, apparently immovable, and which had no fellow on the opposite foot. The hip was merely injured by contusion.

The motions of the foot were unimpaired. The fingers could press upon the head of the astragalus without giving pain, and but for the bony protuberance below the malleolus, a mere sprain would have been diagnosticated. The position of this piece of bone over the os calcis, and its length, about one and a half inches, rendered it pretty certain that but one of two things could have happened, viz., fracture, with dislocation of the astragalus, or the same combination of injuries to the calcaneum; for, that any other tarsal bone could have got in that position, and yet—as will be seen in the sequel—be easily replaced, was not to be supposed. That it was not the calcis, was rendered probable by the immobility of the fragment, by the absence of deformity on the other side of the calcis, and by the absence of crepitus, and of pain on pressure; and when the fragment had been replaced, and subsequently remained without trouble in its restored position, it became daily more and more evident that the bone of the heel was uninjured.

The lesion was therefore as follows: the man had undoubtedly struck the ground while his foot was greatly adducted, thus widening as much as possible the space between the fibular malleolus and the calcis. The astragalus had been split into two portions, the larger remaining with the head and neck, in its normal position, and thus not preventing the usual motions of the foot, while the smaller and outer portion had been violently pressed out beneath the malleolus into the position it occupied when first seen.

The course of treatment to be pursued was somewhat uncertain. Rognetta, whose admirable monograph has been of very great use to me in preparing this paper, declares that luxation of the astragalus, complicated with fracture, universally requires exsection.¹ Yet an unwillingness to neglect the chance, however slight it might be, of effecting reduction, induced me, with the approval and assistance of my colleague, Dr. Charles C. Lee, to make the attempt, which both to my surprise and my gratification, was attended with complete success. While my colleague made firm counter-extension, by grasping the calf of the leg in both hands, I proceeded to the following manipulation. Extending the limb, and having gradually adducted the foot as much as possible, I placed both thumbs over the projecting fragment, and suddenly induced a position of abduction. After this manœuvre had been repeated several times, we heard the bone go in with a dull crushing sound, like that produced by straightening a bent bone. The protuberance had now disappeared, and the foot, except in being swollen, in every respect resembled its fellow of the opposite side. A compress was placed over the spot, lead-water and laudanum applied, and the limb confined to a fracture-box. When all heat had left the ankle, equable pressure

¹ *Mémoire sur l'extirpation de l'astragale.* Paris, 1843, p. 56.

was made by means of a soap plaster and bandage, and from this time forward any one seeing the limb, would have imagined nothing more than an ordinary sprain. On the 26th of December, nearly six weeks after the accident, pasteboard splints were applied, and the patient allowed to get up. He was discharged cured on Monday, January 20th, 1862, having been in the house sixty-four days.

This accident is very rare, and so favourable a result still rarer. Out of 1901 cases of fracture treated at the Middlesex Hospital, between the years 1831 and 1837, a period of six years, there were but two fractured calcanea, and one astragalus.¹ In the record of the Pennsylvania Hospital for the last ten years, I find four cases only recorded.

The first of these was a compound fracture of both astragalus and calcaneum, and was admitted on the 23d of August, 1857. The man was a hard drinker, and was injured by a fall from a second-story window. An effort was made to save the limb, and the dressing employed was the bran dressing of Dr. Barton. A great deal of sloughing ensued, and the patient died from pyemia on the 15th of the following September, having survived the accident twenty-three days.

Another case, also a compound fracture, and complicated by fracture of both bones of the leg, was admitted on the 12th of November, 1858. This man, too, was a drunkard, and was run over by a car on one of the passenger railroads. In this case amputation was performed by the circular method, by Dr. Norris, but the man died one week subsequently, also from pyemia.

The third was a compound fracture, in which the internal malleolus was also involved. An attempt was made to save the limb by means of irrigation, the limb being placed on an inclined plane. Subsequently, however, amputation was performed at the knee-joint, and the man died from prostration, twenty-four days after admission. This patient entered the house on the 16th of May, 1860, his leg having been crushed by a heavy stone; previous to his death, a large abscess formed in the opposite leg.

On the 5th of July of the same year, still another compound fracture of the astragalus was admitted, which was treated in a fracture-box, with a wash of Goulard's extract, and extract of belladonna. This treatment was perfectly successful, the patient leaving the house cured after seventy-five days. This also was a railroad accident.

It will be observed that in none of these cases was the fracture simple, and, in all but the last very seriously complicated. Hence, mine is the only case of simple fracture of this bone received in the Pennsylvania Hospital for ten years at least.

Another curious circumstance is the cause of death in the fatal cases.

¹ Lonsdale, Treatise on Fractures, p. 18.

The two first are recorded as dying, one of pyemia, and one of purulent infection; while the third is said to have died of prostration, but at the same time it is mentioned that a large abscess formed in the right leg (the one not injured), previous to death.

Of the three that died, one survived only a week; the others twenty-three and twenty-four days respectively.

In the second case, the fracture was through the centre of the body; in the other, the direction is not recorded.

In none of these cases is it stated that there was any displacement. In mine, it will be remembered the dislocation was downwards, outwards, and backwards. I have been able to find recorded but one other case in which the dislocation was in this direction. This was Mr. Turner's case, treated at the Manchester Infirmary, in 1841, and detailed in his very valuable paper on *Dislocations of the Astragalus*, in the 11th volume of the *Transactions of the Provincial Medical and Surgical Association*. This was a compound luxation, and the entire bone was thrown out of place, without fracture of either tibia or fibula. Reduction not being practicable, exsection was performed, and the patient recovered in about seven months.

From an examination of the relations of the fibula to the tarsus, it would appear that such a large portion of bone could hardly get out between the malleolus and the calcis; yet also in Rognetta's celebrated case, the whole astragalus was thrown out, while neither malleolus was injured.¹ In some cases the astragalus is found completely inverted, as in Dupuytren's case of forward dislocation.²

In such a case, of course all attempts at reduction would be futile, and an operation would be the only means of procedure to relieve the displacement. This particular form of luxation may, according to Rognetta, sometimes be recognized by the lengthening of the entire foot, due to the astragalus being fixed between the tibia and calcaneum.

The ordinary direction in which the astragalus is luxated, either entire or a fragment, is downwards and forwards, and hence Rognetta declares that the tibia must be almost in a line with the tarsal bones to permit such luxation to occur, and suggests falling upon an inclined plane, with the heel higher than the toes, as the usual cause of this accident; but in my case the fragment was behind, not in front of the malleolus, and hence, I suppose the patient to have fallen upon an almost plain surface, with, perhaps, the toes a little higher than the heel.

Simple luxation of the astragalus is only likely to occur in young and vigorous subjects; as in the old, the malleoli would be more apt to give way than to manifest the elasticity which this luxation requires of them.

There are so few cases recorded in which luxation has been accompanied with fracture, and yet reduction effected, that it is very hard to know what

¹ Op. cit., p. 2.

² Diseases and Injuries of Bones, Lond. Syd. Soc., p. 204.

to say as to the prognosis in such a case. Lonsdale met with a case in which there was fracture (comminuted, however) without any displacement, and in which the real injury was not suspected till after death, which occurred within twelve days from the time the accident happened. Rognetta twice saw simple fractures of the astragalus, but in neither was there any displacement; they both made excellent recoveries.

Dr. Bernard Monahan has collected ten cases of fractured astragalus, nine of which were accompanied with dislocation, and eight of which were compound, but Hamilton, who refers to Dr. Monahan's paper, does not specify the result in any of the cases. Hamilton, himself, has "never met with a simple fracture of a tarsal bone accompanied with displacement."¹ Dr. Norris had a case in the Pennsylvania Hospital in 1831, where there was simple fracture with dislocation downwards and forwards; here, as reduction could not be effected, the fragment was excised by Dr. J. Rhea Barton; caries, however, ensued, and the limb was amputated with a fatal result more than eighteen months after the occurrence of the injury.² Rognetta, in commenting upon this case, thinks that had the whole astragalus been removed in the first place, the result would have been different.

Fabricius Hildanus is the first author who gives a clear account of these injuries: he mentions an instance in which recovery took place after extirpation of the bone.³ Ambrose Paré confused this luxation with that of the entire foot.⁴ Desault saw several cases of dislocated astragalus, in one of which reduction being impossible, he cut down and divided the capsule, thus removing the obstacle to the bone's resuming its place. The result was favourable.⁵ Dupuytren met with ten or twelve cases of luxated astragalus, in some of which reduction was easy, in one, could only be partially effected, and in several of which he performed exsection of the bone.⁶

Malgaigne mentions two or three cases of fracture of the astragalus, but does not record any as occurring in his own practice.⁷

From a theoretical consideration of the matter, it would seem that either simple dislocation or simple fracture would promise better results by itself than when complicated with the other; but if reduction can be effected in a case such as mine, of course, thereafter, it becomes a simple fracture. And hence reduction should be at first attempted as a matter of course, unless the lengthening of the foot should show that complete inversion of the astragalus had taken place. Should reduction be impossible, I should be inclined to follow Desault's example, and by the assistance of the knife, facilitate the restoration of the displaced bone.

¹ Pract. Treatise on Fractures and Dislocations, p. 479.

² Am. Journ. of Med. Sci. for August, 1837.

³ Opera. Cent. II. Obs. 67.

⁴ Opera. Lib. XIV. Cap. 24.

⁵ Œuvres Chirurgicales, tom. I.

⁶ Diseases and Injuries of Bones. Syd. Soc. translation, pp. 316-325.

⁷ Treatise on Fractures. Packard's edit.

In a compound fracture or luxation, it would also be good practice, provided the injury to the soft parts was not excessive, to attempt reduction. If, however, the laceration were very great, or if it were found impossible to effect reduction, exsection would offer the best chance of success. After reduction in a compound luxation, union by the first intention might be aimed at, though it most probably could not be obtained. After the operation of exsection, I should suppose it scarcely worth while to make the attempt.

In no contingency would I be disposed to allow the bone to remain unreduced: inflammation, sloughing, and destruction of the joint would most probably ensue, and, under any circumstances, a lame and useless limb would be likely to remain.

Carious bone within a joint would prove a foreign body of the worst description, and the experience of military surgeons must be remembered, that any foreign body in a joint is much more dangerous than a free incised wound with all its risks of the admission of air to the synovial membrane.

The prognosis of the operation of exsection is very favourable. Heyfelder reports sixty-seven cases of exsection of the astragalus, of which fifty-eight resulted successfully, while in only nine was there a fatal issue. Heyfelder's statistics are referred to in the number of the *Medical and Surgical Reporter* for Nov. 30, 1861.

Amputation, which in Gooch's time,¹ was regarded as almost the only remedy in these cases, it need hardly be said, should never be performed for the lesion of the astragalus alone. In those horrid railroad accidents which are so often seen in city hospitals, in which the whole foot is crushed, of course there is no other chance presented of saving life.

ART. VII.—*On the Colour Tests of Strychnia, as modified by the presence of Morphia.* By ROBERT P. THOMAS, M. D., Professor of Materia Medica, in the Philadelphia College of Pharmacy.

DURING the last few years, the attention of the profession has been attracted to the consideration of the various means which have been recommended for the detection of strychnia in cases of poisoning by that powerful agent; and some of the ablest minds of Europe, and of this country, have contributed the results of their labours to the common stock of knowledge on this important point. Having received a thorough investigation from such hands, and its relations traced in almost every possible combination

¹ Chirurgical Works, vol. ii. p. 360.